STIC Search Report
EIC 2100

STIC Database Tracking Number: 180811

TO: Leslie Wong **Location: RND 3B09** **Art Unit: 2164** **Tuesday, February 28, 2006** **Case Serial Number: 10/014390**	**From: Emory Damron** **Location: EIC 2100** **RND 4B19** **Phone: 571-272-3520** **Emory.Damron@uspto.gov**

Search Notes

Dear Leslie,

Please find below your fast and focused results.
References of potential pertinence have been tagged, but please review all the packets in case you like something I didn't.
Of those references which have been tagged, please note any manual highlighting which I've done within the document.
In addition to searching on Dialog, I also searched EPO/JPO/Derwent.
There may be a few decent references contained herein, but I'll let you determine how useful they may be to you.
Please contact me if I can refocus or expand any aspect of this case, and please take a moment to provide any feedback (on the form provided) so EIC 2100 may better serve your needs. Good Luck!

Sincerely,
Emory Damron
Technical Information Specialist
EIC 2100, US Patent & Trademark Office
Phone: (571) 272-3520
Emory.damron@uspto.gov

STIC EIC 2100 Search Request Form

180811

157

Today's Date: 2/28/06

What date would you like to use to limit the search?

Priority Date: 12/14/2001 Other:

Name Leslie Wong

AU 2164 Examiner # 78953

Room # 3B09 Phone 2-4120

Serial # 10/014,390

Format for Search Results (Circle One):

PAPER DISK EMAIL

Where have you searched so far?

USP DWPI EPO JPO ACM IBM TDB

IEEE INSPEC SPI Other

Is this a "Fast & Focused" Search Request? (Circle One) YES NO

A "Fast & Focused" Search is completed in 2-3 hours (maximum). The search must be on a very specific topic and meet certain criteria. The criteria are posted in EIC2100 and on the EIC2100 NPL Web Page at http://ptoweb/patents/stic/stic-tc2100.htm.

What is the topic, novelty, motivation, utility, or other specific details defining the desired focus of this search? Please include the concepts, synonyms, keywords, acronyms, definitions, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract, background, brief summary, pertinent claims and any citations of relevant art you have found.

Topic: photocuring to provide high quality bonding on polymers using wavelength of light

please search for: Selecting wavelength component from a database, and wavelength has names associated w/ its spectrum.

* Selecting at least two wavelengths from the database.

East ~~search attached~~ claims

PGPUB/2003/83753

STIC Searcher Eileen DAMRON Phone 23520

Date picked up 2/28/06 Date Completed 2/28/06

xCOPY

STIC Search Results Feedback Form

EIC 2100

Questions about the scope or the results of the search? Contact ***the EIC searcher or contact:***

Anne Hendrickson, EIC 2100 Team Leader
272-3490, RND 4B28

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* 2164 *Example: 2133*
- *Relevant prior art **found**, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

  Types of relevant prior art found:
  - ☐ Foreign Patent(s)
  - ☐ Non-Patent Literature
    (journal articles, conference proceedings, new product announcements etc.)
- *Relevant prior art **not found:***
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/EIC2100 RND, 4B28

```
? d s
Set     Items   Description
S1      94938   S PHOTOCUR? OR (PHOTO OR LIGHT? OR LUMEN? OR EM OR THERM?)()(CURE? ? OR
CURING OR CURAT?) OR THERMOCUR? OR THERMOSET?
S2     288960   S CURE? OR CURING OR (HEAT? OR LIGHT? OR PHOTO? ? OR LUMEN? OR
THERM?)()(SET OR SETS OR SETTING)
S3     299814   S (LIGHT? OR HEAT OR LUMEN? OR THERMO? OR PHOTO?)()TREAT? OR THERMOTREAT?
OR PHOTOTREAT? OR HEATTREAT? OR LIGHTTREAT?
S4      17396   S (PHOTO? OR HEAT? OR LUMEN? OR THERMO? OR LIGHT?)()(GLUE? OR ADHES? OR
EPOX? OR BOND?)
S5        297   S PHOTOADHES? OR THERMOADHES?
S6     661349   S S1:S5
S7      11495   S WAVELENGTH? OR WAVE()LENGTH? OR ANGSTROM? OR LUMEN? ? OR PHOTON? ? OR
LIGHT()PARTICLE?
S8          4   S LIGHTWATT? OR LIGHT()WATT? ? OR CANDELA? ? OR CANDLEPOWER? OR
CANDLEPOWER? OR TALBOT? OR LUMBERG?
S9       3515   S NAME? OR DESIGNATION? OR ASSIGNATION? OR CATEGOR? OR CLASSIFIC?
S10      3018   S TAG OR TAGS OR TAGGED OR TAGGING OR MARKER? OR LABEL?
S11      1294   S IDENTIFIER? OR FLAG? OR TAB OR TABS OR TABBED OR TABBING?
S12      1986   S SPECTRUM? OR SPECTROSCOP? OR SPECTROGRAPH? OR (EM OR ELECTRO? OR
MAGNETIC?)()FREQUENC?
S13       411   S (LIGHT? OR PHOTO?? OR LUMEN?)(2N)(DISTRIBUTION? OR AMBIT? ? OR RANGE? ?
OR GAMUT? ? OR SCALE? OR AMPLITUD?)
S14     89916   S SELECT? OR CHOOS? OR ACTUAT? OR CLICK? OR PICK? OR OPT OR OPTS OR OPTED
OR OPTING OR OPTION? OR ACTIVAT?
S15       193   S CUSTOMIZ? OR CUSTOMIS? OR PERSONALIS? OR PERSONALIZ? OR INDIVIDUALIZ? OR
INDIVIDUALIS?
S16    136906   S ELECT? OR PICK? OR DESIGNAT? OR DISCRIMINAT? OR ASSIGN? OR SPECIFY? OR
PRESET? OR SCHEDUL? OR EXECUT?
S17     63590   S BEFOREHAND? OR IN()ADVANC? OR BEFORE? OR PREVIOUS? OR PREDAT? OR
PREDETERMIN? OR PRESELECT? OR REQUEST?
S18    106474   S TWO OR MORE(2W)ONE OR TWO(2W)MORE OR SEVERAL? OR 2ND OR NUMEROUS? OR
PLURAL? OR MULTIP? OR MULTIT?
S19    142689   S DUAL? OR PAIR? OR TWIN OR ANOTHER? OR EXTRA OR DIFFERENT OR OTHER? OR
AUXILIAR? OR ALTERNAT?
S20      1061   S DATABASE? OR DATAFILE? OR DATAREPOSITOR? OR DATABANK? OR DB OR DBS OR
DATA?()(BASE? OR FILE? OR REPOSITOR? OR BANK? OR STORAG? OR RECORD? OR SYSTEM?)
S21      6235   S COMPUTER? OR PROCESSOR? OR DATAPROCESSOR? OR MICROPROCESSOR? OR SERVER?
OR CENTRALPROCESSOR? OR CPU? ?
S22    229718   S POLYMER? OR THERMOPOLYMER? OR PLASTIC? OR THERMOPLASTIC? OR
POLYCARBONAT? OR POLYETHYLENE? OR POLYURETHAN?
S23     61152   S PMMA OR POLYIMIDE? OR POLYAMID? OR POLYOLEFIN? OR POLYSULFONE? OR
COPOLYMER? OR POLYBUTYLENE?
S24     68753   S ETHYLEN?()VINYL?()ACETAT? OR POLYESTER? OR PHENOPLAST? OR (PHENOL? OR
ACRYLIC?)()RESIN?
S25       874   S IC=G06F?
S26      1146   S MC=T01?
S27      7850   S S6 AND (S20:S21 OR S25:S26)
S28      3285   S S27 AND S22:S24
S29       308   S S28 AND (S7:S8 OR S12:S13)
S30        17   S S29 AND S9:S11
S31        65   S S29 AND S14:S17(15N)(S18:S19 OR S7:S8 OR S12:S13)
S32        29   S S29 AND (S7:S8 OR S12:S13)(7N)S20:S21
S33       109   S S29 AND S1:S5(7N)S22:S24
S34         2   S S29 AND S9:S11(10N)(S7:S8 OR S12:S13)
S35       179   S S30:S34
S36        36   S S29 AND S25:S26
S37        53   S S29 AND S20:S21(20N)(S7:S8 OR S12:S13)
S38       193   S S35:S37
S39        89   S S38 AND AC=US/PR
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S40          57   S S39 AND AY=(1970:2001)/PR
S41          37   S S39 NOT AY=(2002:2006)/PR
S42          57   S S40:S41
S43         104   S S38 NOT S39
S44          55   S S43 AND PY=1970:2001
S45          41   S S43 NOT PY=2002:2006
S46          55   S S44:S45
S47         112   S S42 OR S46
S48         112   IDPAT (sorted in duplicate/non-duplicate order)
 ; show files
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[File 347] **JAPIO** Nov 1976-2005/Oct(Updated 060203)

[File 350] **Derwent WPIX** 1963-2006/UD,UM &UP=200614

**File 350: For more current information, include File 331 in your search. Enter HELP NEWS 331 for details.*

48/3,K/8 (Item 8 from file: 350) **Links**
Derwent WPIX

016806759
WPI Acc No: 2005-131039/200514
Related WPI Acc No: 2003-120904; 2003-167304; 2003-330402; 2003-416635; 2004-375399; 2004-440528; 2004-532670
XRAM Acc No: C05-043103
XRPX Acc No: N05-112289

Marking readout area of optical media e.g. DVD involves applying coating containing color forming material to readout area; exposing to wavelengths; curing coating in readout area(s) and selectively exposing to another set of wavelengths

Patent Assignee: SPECTRA SYSTEMS CORP (SPEC-N)
Inventor: AFZAL R; BERUBE A; CONROY J L; LEWIS D; SMUK A
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20050018595	A1	20050127	US 2001296308	P	20010606	200514 B
			US 2001310914	P	20010808	
			US 2001311160	P	20010809	
			US 2002165273	A	20020606	
			US 2003665837	A	20030918	

Priority Applications (No Type Date): US 2003665837 A 20030918; US 2001296308 P 20010606; US 2001310914 P 20010808; US 2001311160 P 20010809; US 2002165273 A 20020606
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20050018595	A1		96	B05D-005/06	Provisional application US 2001296308
					Provisional application US 2001310914
					Provisional application US 2001311160
					CIP of application US 2002165273

... **e.g. DVD involves applying coating containing color forming material to readout area; exposing to wavelengths; curing coating in readout area(s) and selectively exposing to another set of wavelengths**

Abstract (Basic):
... forming material to readout area of optical media; exposing the coating to first set of **wavelengths**; **curing** coating applied upon at least one readout area and **selectively** exposing portion(s) of layer(s) of coating in pattern for recording marking into coating using a second set of **wavelengths** substantially separate from first set of **wavelengths**.
... one readout area of the optical media; a first light source for exposing (C1) to **wavelengths** of light capable of **curing**

(C1) upon the at least one readout area; a unit for creating an image of...

...2) a system (S2) for applying a color coating (C2) containing a **photocurable** component sensitive to a first set of **wavelengths** and a photosensitive color forming component sensitive to a second set of **wavelengths** substantially separate from the first set of **wavelengths** to the readout area of an optical media comprising: a unit for applying (C2), to...

...optical media; and a light source for exposing the coating to the first set of **wavelengths**;
(...

...an image of the marking; and a light source for producing the second set of **wavelengths** and exposing at least a portion of the coating to the image for recording the...

...source for exposing the at least one color forming layer to a first band of **wavelengths** to **cure**; a second light source for **selectively** exposing at least a portion of the at least one color forming layer to a second band of **wavelengths** for recording the marking into at least one color forming layer, a unit for applying...

...light source for exposing the at least one overcoat layer to a third band of **wavelengths** for **curing** the at least one overcoat layer; and...

...5) a **computer** program stored on **computer** readable media comprising: a set of instructions for operation of a system for producing optical...

...a readout area of the optical media; exposing the coating to a first set of **wavelengths**; **curing** the coating applied upon the at least one readout area; and **selectively** exposing portions of the coating in a pattern for recording the marking into the coating by using a second set of **wavelengths** substantially separate from the first set of **wavelengths**.

Technology Focus:
... layer of the optical media, and further involves applying at least one photoabsorptive material. The **curing** step is carried out in an environment comprising an inert gas. The first and second set of **wavelengths** comprises **wavelengths** above 370 nm, and between 270 - 320 nm, respectively. The step of **selective** exposure involves using a photomask and/or a direct writing laser. The method further involves...

...one color forming layer; and exposing the overcoat layer(s) to a third band of **wavelengths** for **curing** the overcoat layer...

...the marking; or an electronically programmable photomask for forming an

image of the marking. The **wavelengths** produced by the first light source are substantially separate from that produced by the second light source. At least one of the first and second light sources comprises a **wavelength** filter (preferably a **wavelength** cutoff filter rated for **wavelengths** between 340 - 370 nm). (S1) comprises an optical media replication system, and further comprises a ...

...inspection station for inspecting the quality of at least one of the substrate, coating, the **curing** of the coating and the marking in the coating; and a system controller for operating...

...overcoat layer(s) exhibit a high degree of optical density at the second band of **wavelengths**.

...

...**POLYMERS** - ...

....methyl 3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionate and PEG (**polyethylene** glycol) 300, linear or branched 2-(2H-benzotriazol-3-yl)-6-dodecyl-4-methylphenol, 2...include instruction for operation of at least one of the inspection station, spin coating station, **curing** station or the marking station.

...Title Terms: **WAVELENGTH**;

Manual Codes (EPI/S-X): **T01-J07B**...

...**T01-S03**

US 20050018595A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0018595 A1**

Conroy et al. (43) **Pub. Date: Jan. 27, 2005**

(54) **SYSTEM FOR APPLYING MARKINGS TO OPTICAL MEDIA**

(75) Inventors: **Jeffrey L. Conroy**, Rumford, RI (US); **Andrei Smuk**, Providence, RI (US); **Robert Afzal**, Providence, RI (US); **Dana Lewis**, North Kingstown, RI (US); **Allison Berube**, Somerset, MA (US)

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(73) Assignee: **Spectra Systems Corporation**

(21) Appl. No.: **10/665,837**

(22) Filed: **Sep. 18, 2003**

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/165,273, filed on Jun. 6, 2002.

(60) Provisional application No. 60/296,308, filed on Jun. 6, 2001. Provisional application No. 60/310,914, filed on Aug. 8, 2001. Provisional application No. 60/311,160, filed on Aug. 9, 2001.

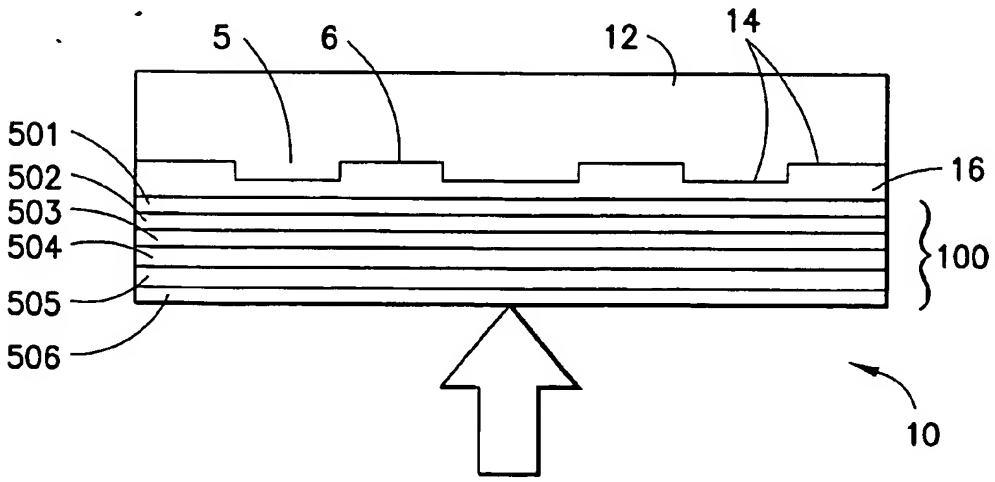
Publication Classification

(51) **Int. Cl.**[7] **B05D 5/06**

(52) **U.S. Cl.** **369/288**; 264/1.33; 427/162

(57) **ABSTRACT**

Disclosed herein is a system for recording a marking in the readout area of an optical media, wherein the marking does not interfere, or substantially interfere, with the readout of data from the optical media. The system disclosed herein is supportive of commercial production requirements. Markings may contain content as desired by the user of the system, including text, graphics, or other items. The marking is formed in a photosensitive coating that is applied to the optical media, and then cured with a first light. A second light, having a substantially separate band of wavelengths from the first light, is used to image a marking into the coating. The coating is robust to many external influences, such as ambient environmental conditions, and physical wear.



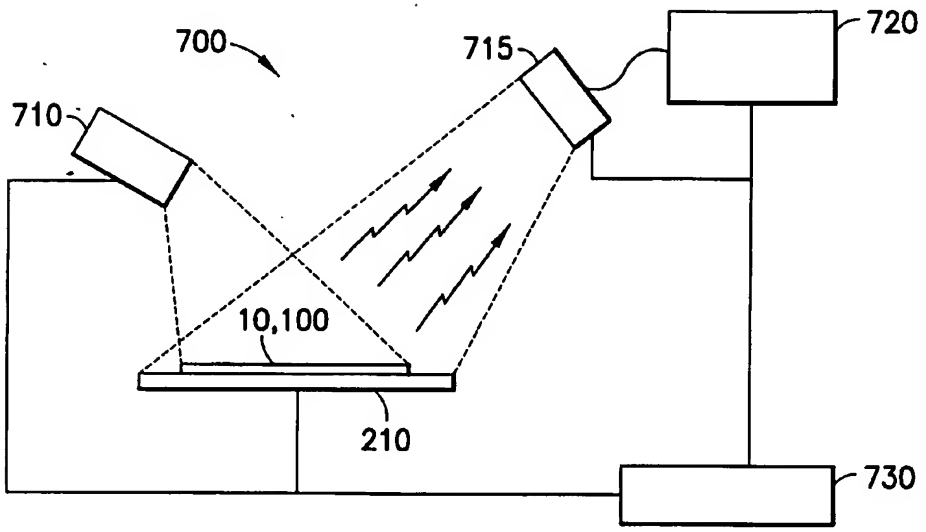

700
715
720
710
10,100
210
730

FIG.72

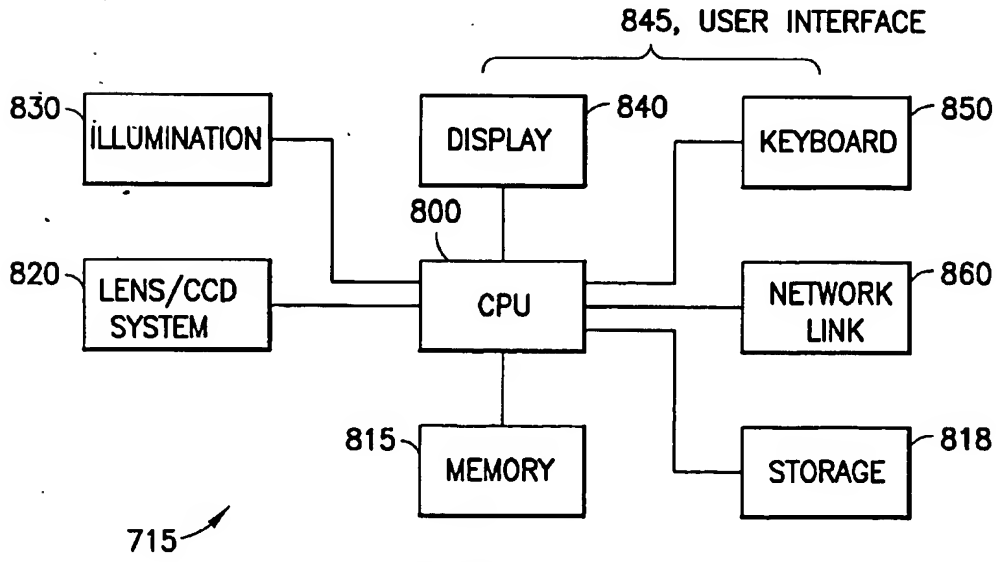

845, USER INTERFACE
830
ILLUMINATION
DISPLAY
840
KEYBOARD
850
800
820
LENS/CCD SYSTEM
CPU
NETWORK LINK
860
815
MEMORY
STORAGE
818
715

FIG.73

benzotriazol-2-yl)-6-dodecyl-4-methylphenol; 2-(2'hydroxy-5'methacryloxyethylphenyl)-2H-benzotriazole; 2,2'-dihydroxy-4-methoxybenzophenone; 2-Hydroxy-4-n-octoxybenzophenone; and, octyl methoxycinnamate.

16. The system as in claim 1, wherein the system comprises an optical media replication system.

17. The system as in claim 1, wherein the format of the optical media comprises one of DVD 5, DVD 9, DVD 10, DVD 18, DVD-R, DVD-RW, CD-Audio, CD-Video, CD-R, CD-RW, CD-ROM, CD-ROM/XA, CD-i, CD-Extra, CD-Photo, Super-Audio CD, Blu-Ray, Mini-Disc and a hybrid format.

18. The system as in claim 1, wherein the applying unit comprises at least one spin coating station.

19. The system as in claim 1, wherein the image creating unit comprises a photomask comprising an image of the marking.

20. The system as in claim 1, wherein the image creating unit comprises a direct writing laser for forming an image of the marking.

21. The system as in claim 1, wherein the image creating unit comprises an electronically programmable photomask for forming an image of the marking.

22. The system as in claim 1, further comprising an inspection station for inspecting the quality of at least one of the substrate, the coating, the curing of the coating, and the marking in the coating.

23. The system as in claim 1, wherein the coating is applied to one of the substrate layer, the reflective layer, and the protective layer of the optical media.

24. The system as in claim 1, further comprising a system controller for operating the system.

25. The system as in claim 1, wherein the marking comprises at least one of: text information, alphanumeric characters, symbols, graphic information, embedded information, a digital watermark and a covert marking.

26. The system as in claim 1, wherein the marking comprises at least one of identification information, authentication information, instructional information, advertising, branding, and promotional information.

27. A system for applying a color forming coating to the readout area of an optical media, the system comprising:

a unit for applying the color forming coating to the readout area of the optical media, the coating comprising a photocurable component sensitive to a first set of wavelengths and a photosensitive color forming component sensitive to a second set of wavelengths substantially separate from the first set of wavelengths;

a light source for exposing the coating to the first set of wavelengths.

28. A system for marking the readout area of an optical media, the system comprising:

a station for receiving the optical media, the optical media comprising at least a color forming coating disposed thereon, the coating comprising a photocurable component sensitive to a first set of wavelengths and a photosensitive color forming component sensitive to a second set of wavelengths substantially separate from the first set of wavelengths, a unit for creating an image of a marking; and,

a light source for producing the second set of wavelengths and exposing at least a portion of the coating to the image for recording the marking into the coating.

29. The system as in claim 28, further comprising a unit for applying an overcoat over the color forming coating.

30. A method for marking a readout area of an optical media, comprising:

applying a coating comprising at least one color forming material to the readout area of the optical media;

exposing the coating to a first set of wavelengths;

curing the coating applied upon the at least one readout area;

selectively exposing portions of the coating in a pattern for recording the marking into the coating by using a second set of wavelengths substantially separate from the first set of wavelengths.

31. The method as in claim 30, wherein applying the coating comprises spincoating the coating onto the optical media.

32. The method as in claim 30, wherein applying comprises controlling the temperature of the color forming material.

33. The method as in claim 30, wherein applying comprises controlling the viscosity of the coating.

34. The method as in claim 30, wherein applying comprises controlling the thickness of the coating.

35. The method as in claim 30, wherein applying comprises replacing a component layer of the optical media.

36. The method as in claim 30, wherein curing comprises providing an environment comprising an inert gas.

37. The method as in claim 30, wherein the first set of wavelengths comprises wavelengths above about 370 nm.

38. The method as in claim 30, wherein the second set of wavelengths comprises wavelengths between about 270 nm to about 320 nm.

39. The method as in claim 30, wherein selectively exposing comprises using at least one of a photomask and a direct writing laser.

40. The method as in claim 30, wherein applying a coating further comprises applying at least one photoabsorptive material.

41. A computer program stored on computer readable media comprising a set of instructions for operation of a system for producing optical media comprising at least one marking disposed upon the readout side of the optical media, the instructions for:

applying a coating comprising at least one color forming material to the readout area of the optical media;

exposing the coating to a first set of wavelengths;

curing the coating applied upon the at least one readout area;

selectively exposing portions of the coating in a pattern for recording the marking into the coating by using a second set of wavelengths substantially separate from the first set of wavelengths.

42. The computer program as in claim 41, wherein the instructions for operation are executed by a system controller adapted for controlling the operation of the system.

43. The computer program as in claim 41, wherein the instructions for operation comprise instruction for operation

48/3,K/37 (Item 37 from file: 350) **Links**
Derwent WPIX

014507801 **Image available**
WPI Acc No: 2002-328504/200236
XRPX Acc No: N02-257772
Photo curing light system for photosensitive, polymeric compounds, has microprocessor linked with intensity control module and lamp power supply to modulate intensity of light delivered by lamp
Patent Assignee: CHI H (CHIH-I); GEMUNDER E R (GEMU-I); AIR TECH INC (AIRT-N)
Inventor: CHI H; GEMUNDER E R
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020014864	A1	20020207	US 2000206584	P	20000525	200236 B
			US 2001861735	A	20010521	
US 6522086	B2	20030218	US 2000206584	P	20000525	200317
			US 2001861735	A	20010521	

Priority Applications (No Type Date): US 2000206584 P 20000525; US 2001861735 A 20010521
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020014864	A1		6	H05B-037/02	Provisional application US 2000206584
US 6522086	B2			G05F-001/00	Provisional application US 2000206584

Photo curing light system for photosensitive, polymeric compounds, has microprocessor linked with intensity control module and lamp power supply to modulate intensity of light delivered...

Abstract (Basic):
... A **microprocessor** (28) is linked with an intensity control module (32) and a lamp power supply (14) to modulate the intensity of the light delivered to a **polymeric** compound by a lamp (16). The digital signal of the **microprocessor** is converted into an analog signal in the intensity control module. The analog signal controls...
... An INDEPENDENT CLAIM is also included for a method of **curing** light sensitive **polymeric** compositions and reducing the heating effect to surrounding material...

...For **photo curing** photosensitive, **polymeric** compounds preferably used in dental work or treatment...

...Operates in wider light **spectrum**. Accommodates photo initiators

having wide variety of absorption bands. Minimizes heating of surrounding material e.g. tooth structure, applied with photosensitive **polymeric** compound...

...The figure shows the block diagram of a **photo curing** light system...

...**Microprocessor** (28
...Title Terms: **CURE**;

US 20020014864A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0014864 A1

Gemunder et al. (43) Pub. Date: Feb. 7, 2002

(54) PHOTO CURING LIGHT SYSTEM HAVING MODULATED LIGHT INTENSITY CONTROL

(76) Inventors: Elliot R. Gemunder, Dix Hills, NY (US); Hyeok-Jae (Daniel) Chi, Wheeling, IL (US)

Correspondence Address:
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Suite 7A
136 Drum Point Road
Brick, NJ 08723 (US)

(21) Appl. No.: 09/861,735

(22) Filed: May 21, 2001

Related U.S. Application Data

(63) Non-provisional of provisional application No. 60/206,584, filed on May 25, 2000.

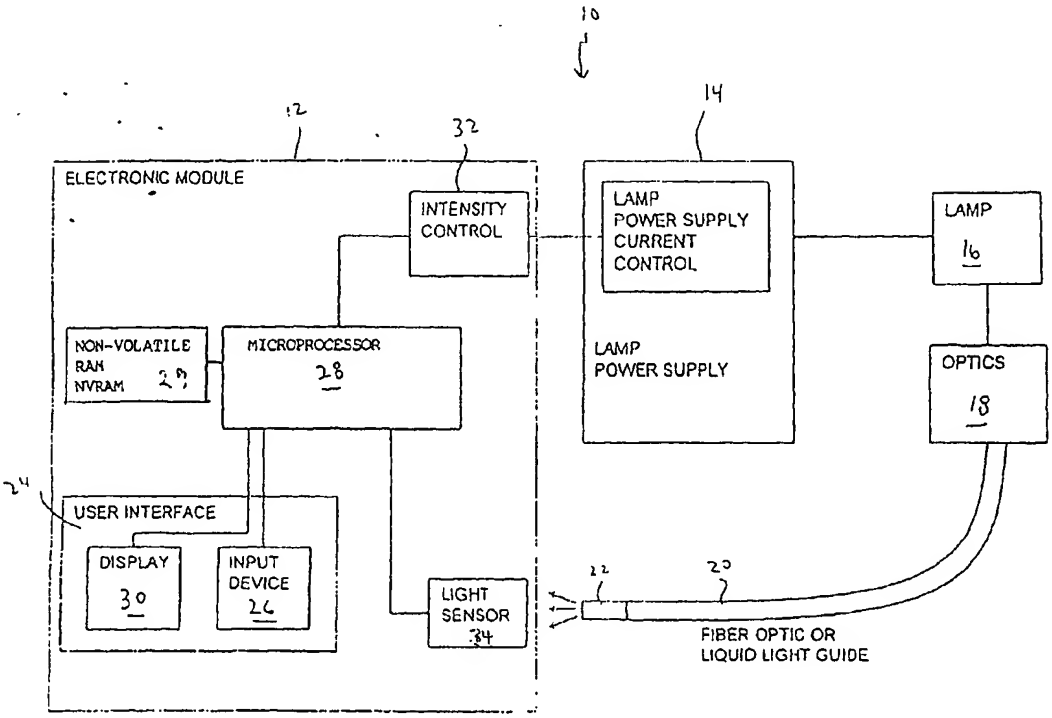
Publication Classification

(51) Int. Cl.[7] H05B 37/02

(52) U.S. Cl. 315/291; 315/149

(57) ABSTRACT

A photo-curing light system in which a modulation of the light intensity or output is controlled via an analogue control voltage to the control line output of the lamp power supply. The control signal results in the lamp current being reduced from its maximum value to a lower value on a continuous and repeated basis thereby modulating the light and reducing the heating value to surrounding material such as tooth structure during the curing process.



[0020] The electronic module **12** of the photo-curing light system **10** is comprised of a micro-processor **28** which is in communication with a user interface **24**, including an input pad **26** upon which the dentist or dental technician enters light intensity data and/or time duration data. A display device **30** displays the time and/or intensity.

[0021] In operation, when the modulated light mode is selected, the inputted data via input pad **26** is communicated to micro-processor **28** and thence to an intensity control module **32** which in turn controls the lamp power supply **14** and the amount of current transmitting to lamp **16** in order to obtain the intensity selectively inputted via input pad **26**. The optics module **18** would contain the various filters presently used to reduce the heating effects from the infrared (IR). This unit may also include a memory chip **29** and a light sensor **34** for calibration.

[0022] **FIG. 2** illustrates the control mechanism for the lamp intensity. This circuitry provides for modulation of the light and thus the reduced heating effect when operating in a wider spectral range. The modulation is achieved by controlling the lamp current via an analog control voltage to the control line input of the lamp power supply. Micro-processor **28** generates a digital signal **51** which is then converted to an analog signal by means of a digital to analog converter integrated circuit **56**. The analog signal **54** is in communication with a constant current circuit **58** having an amplifier integrated circuit **60** and transistor **61**. The analog control signal **54** results in the lamp current **52** being reduced from its maximum program value to a lower value on a continuous and repeated basis resulting in modulation of the light output.

[0023] The ratio of the time that the lamp current is at its maximum divided by the total time period of maximum and low lamp current (e.g. total exposure time) is defined as the duty cycle. Control of the duty cycle is also available through the user interface. The lower the duty cycle, the lower the temperature rise in the surrounding tooth structure. Control of modulation is achieved by adjusting the duty cycle and total time period to ensure that the lamp out put has sufficient time to reach its maximum and minimum light levels.

[0024] **FIG. 3** is a graph illustrating the present state of the art with a continuous light output at a particular intensity for a particular time period. **FIG. 4** is a graph illustrating a lamp in which the intensity is modulated in accordance with the teachings herein. Clinical tests at the School of Dentistry of a leading University have shown that reduction of the duty cycle from 100% (no modulation) to 50% did not statistically alter the conversion values at either the top surface or at a depth of 2 mm when using a 10 second exposure of composite Z-100 (A2). With a 50% duty cycle and a 5 second exposure the conversion values were not statistically different at the top surface and only slightly lower at a 2 mm depth as compared to a 100% duty cycle. The addition of modulation at a 50% duty cycle reduced the intrapulpal temperature rise by approximate 27% for a 10 second exposure time.

[0025] While the present invention has been described with respect to the exemplary embodiments thereof, it will be recognized by those or ordinary skill in the art that many modifications may be made without departing from the spirit and scope of the invention. Therefore it is manifestly intended that the invention be limited only by the scope of the claims and the equivalents thereof.

We claim:

1. An apparatus for curing light sensitive, polymeric compositions with a light source, an optical light guide system, a control unit for controlling the irradiation time, an input unit for inputting of the irradiation time by the user, a display unit for displaying the irradiation time set and/or remaining, a control unit for controlling the light output delivered by the light source, a light filtering system, and a means for modulating the light intensity delivered by the light source to the polymeric composition.

2. The apparatus in accordance with claim 1 wherein the modulation of the light intensity is controlled by a micro-processor digital signal converted to an analogue control voltage in communication with the control line output of said light source reducing lamp current from a maximum value to a lower value repeatedly.

3. The apparatus in accordance with claim 2 wherein said light intensity is modulated on a constant basis or on a stepped form basis by the control unit during an irradiation procedure.

4. A method of curing light sensitive polymeric compositions and reducing the heating affect to surrounding material utilizing a light source, an optical light guide system, a control unit for controlling the irradiation time, an input unit for inputting the irradiation time by the user, a display unit for displaying the irradiation time set and/or remaining, a control unit for controlling the light output delivered by said light source wherein said method comprises modulating said light source during the irradiation time by means of a microprocessor generating a digital signal convertible to an analogue signal by means of a digital to analogue converter integrated circuit, said analogue signal in communication with a constant current circuit having an amplifier integrated circuit and transistor, said analogue control signal reducing lamp current from its maximum value to a lower value on a continuous and repeated basis.

* * * * *

48/3,K/74 (Item 74 from file: 350) **Links**
Derwent WPIX

012104548 **Image available**
WPI Acc No: 1998-521460/199844
XRPX Acc No: N98-407223
Three-dimensional model generation method - using spatial light modulator to expose successive layers of photo-polymer resin in single shot
Patent Assignee: REPLICATOR SYSTEMS INC (REPL-N)
Inventor: HAGENAU W R
Number of Countries: 020 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9841944	A1	19980924	WO 98US5518	A	19980319	199844	B
US 6051179	A	20000418	US 9739362	A	19970319	200026	
			US 9840829	A	19980318		

Priority Applications (No Type Date): US 9739362 P 19970319; US 9840829 A 19980318
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9841944	A1	E	32	G06F-019/00	
Designated States (National): CA JP					
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
US 6051179	A			B29C-035/08	Provisional application US 9739362

... **using spatial light modulator to expose successive layers of photo-polymer resin in single shot**

...Abstract (Basic): a radiant energy source (12) of a wide beam of radiant energy of intensity and **wavelength** for **curing** a layer of photo-curable resin (16) contained in a vat. A spatial light modulator (SLM) (11) has an array of pixel elements (13) which are individually controlled by a **computer** (10), for modulating the radiant energy beam projected from the source on a pixel by...

...the SLM (11), one at a time, onto successive layers of photo-curable resin for **predetermined** exposure times to form stacked laminate of **cured** resin, each in the shape of a **different** cross-sectional laminae...

...USE - Forming three-dimensional models from liquid photo-**polymer**.

...Title Terms: **POLYMER**;
...International Patent Class (Main): **G06F-019/00**
Manual Codes (EPI/S-X): **T01-J10C4**...

...T01-J15X

48/3,K/47 (Item 47 from file: 350) **Links**
Derwent WPIX

014122373 **Image available**
WPI Acc No: 2001-606585/200169
Related WPI Acc No: 2000-125853; 2002-546030
XRPX Acc No: N01-452706
Light curing system for polymeric materials, has computer control system for regulating production of exposure light based on selected modulation scheme and cured material
Patent Assignee: LASERMED INC (LASE-N)
Inventor: KAUFMAN D W; OSTLER C D; OSTLER K D
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6282013	B1	20010828	US 9745140	A	19970430	200169	B
			US 9867085	A	19980427		

Priority Applications (No Type Date): US 9745140 P 19970430; US 9867085 A 19980427
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6282013	B1		31	G02F-001/33	Provisional application US 9745140

Light curing system for polymeric materials, has computer control system for regulating production of exposure light based on selected modulation scheme and cured material

Abstract (Basic):
... selected intensities is generated at selected periods of time by a light producing device (2602) **actuated** by a power supply (2601). Generated light is manipulated by a **wavelength** separating, mixing and eliminating device (2603). Power supply and device (2603) are controlled by **computer** control system (2605) to produce light based on selected modulation scheme and **cured** material.
... a) Dental material **curing** system...

...b) Monomer material **polymerizing** system...

...For **curing polymeric** materials used in dentistry...

...Enables to **cure** dental materials quickly and to specific physical state and enables to tailor post **cure** properties of dental materials. Optimizes performance of dental materials for particular application environment, by **curing** techniques. Reduces capital investment cost of the equipment by using single light power source.

Enables to obtain a **cured** dental material with desired strength, hardness, lack of brittleness and other properties. Minimizes shrinkage of dental material, during **cure** by using a suitable modulation scheme and produces flexible dental material having significant surface or...

...The figure depicts the block diagram of the **polymeric** material **curing** system...

...**Wavelength** separating/mixing/eliminating device (2603...

...**Computer** control system (2605

...Title Terms: **CURE**;

US006282013B1

(12) **United States Patent**
Ostler et al.

(10) **Patent No.: US 6,282,013 B1**
(45) **Date of Patent: Aug. 28, 2001**

(54) **SYSTEM FOR CURING POLYMERIC MATERIALS, SUCH AS THOSE USED IN DENTISTRY, AND FOR TAILORING THE POST-CURE PROPERTIES OF POLYMERIC MATERIALS THROUGH THE USE OF LIGHT SOURCE POWER MODULATION**

(75) Inventors: **Calvin D. Ostler; Kevin D. Ostler**, both of Riverton; **David W. Kaufman**, Salt Lake City, all of UT (US)

(73) Assignee: **LaserMed, Inc.**, West Jordan, UT (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/067,085**

(22) Filed: **Apr. 27, 1998**

Related U.S. Application Data

(60) Provisional application No. 60/045,140, filed on Apr. 30, 1997.

(51) **Int. Cl.**[7] **G02F 1/33**
(52) **U.S. Cl.** **359/309**; 359/305; 522/908; 427/492; 523/116
(58) **Field of Search** 359/305, 307, 359/308, 309; 522/4, 908; 433/29; 427/492, 493; 523/116

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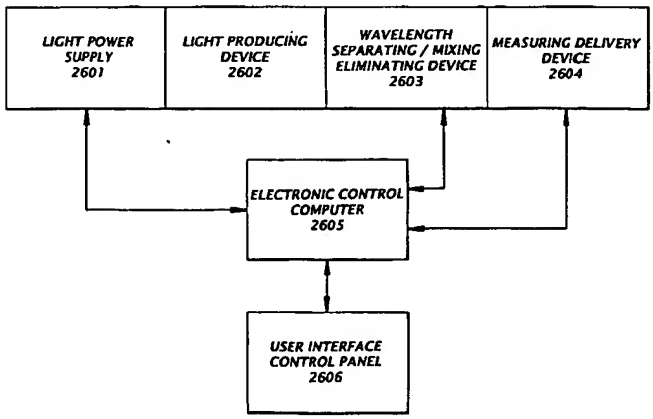
Mehl et al., "Soft Start Polymerizatoin of Composites in Class V Cavities", Dtsch Zhnarztl Z52/1997, pp. 824–827. (English translation).

Primary Examiner—Huy Mai
(74) *Attorney, Agent, or Firm*—Daniel McCarthy

(57) **ABSTRACT**

A method and system are disclosed for curing polymeric materials including dental composites. Preferably, modulated light is used to control the formation of polymer chains in the polymeric material so that a cured polymeric material that has the desired physical characteristics for its intended function. Formation of short chain and long chain polymers from monomers in the polymeric material is initiated and controlled by using a light source with a wavelength suitable for one or more initiators found in the polymeric material.

24 Claims, 14 Drawing Sheets



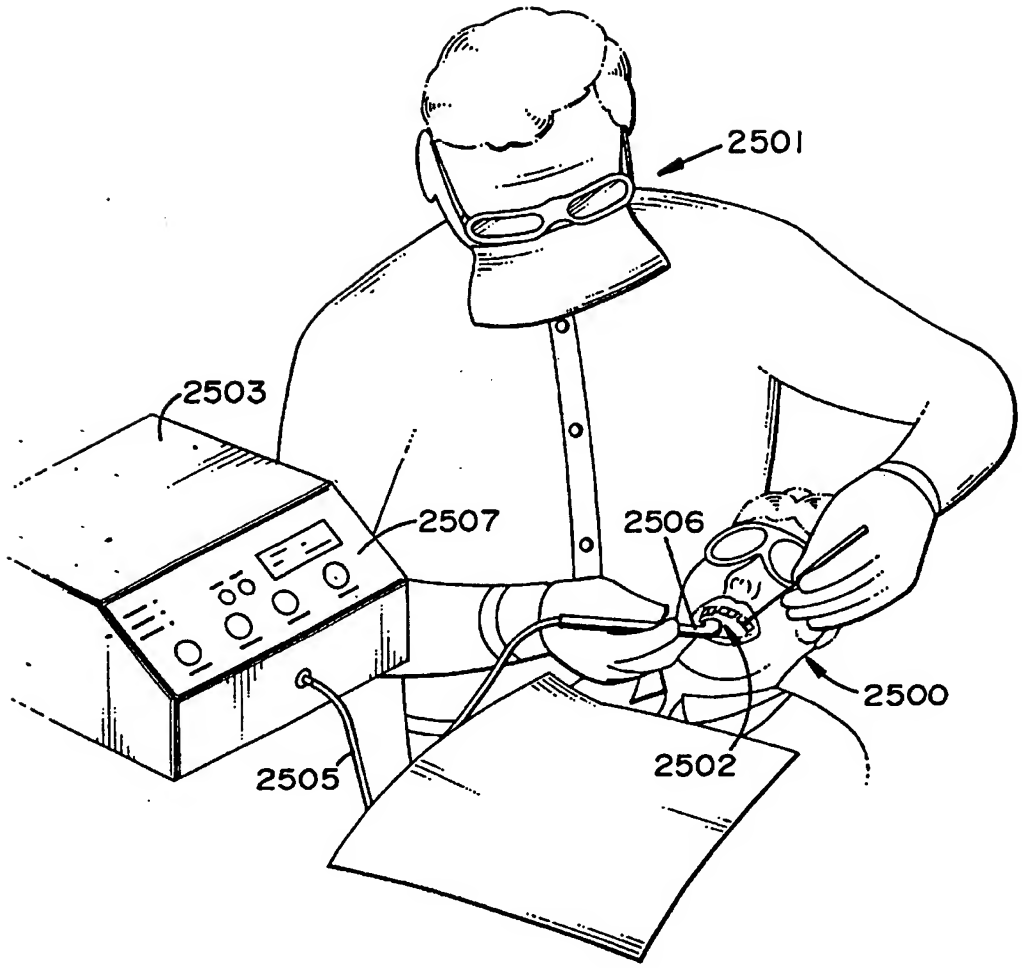


FIG. 25

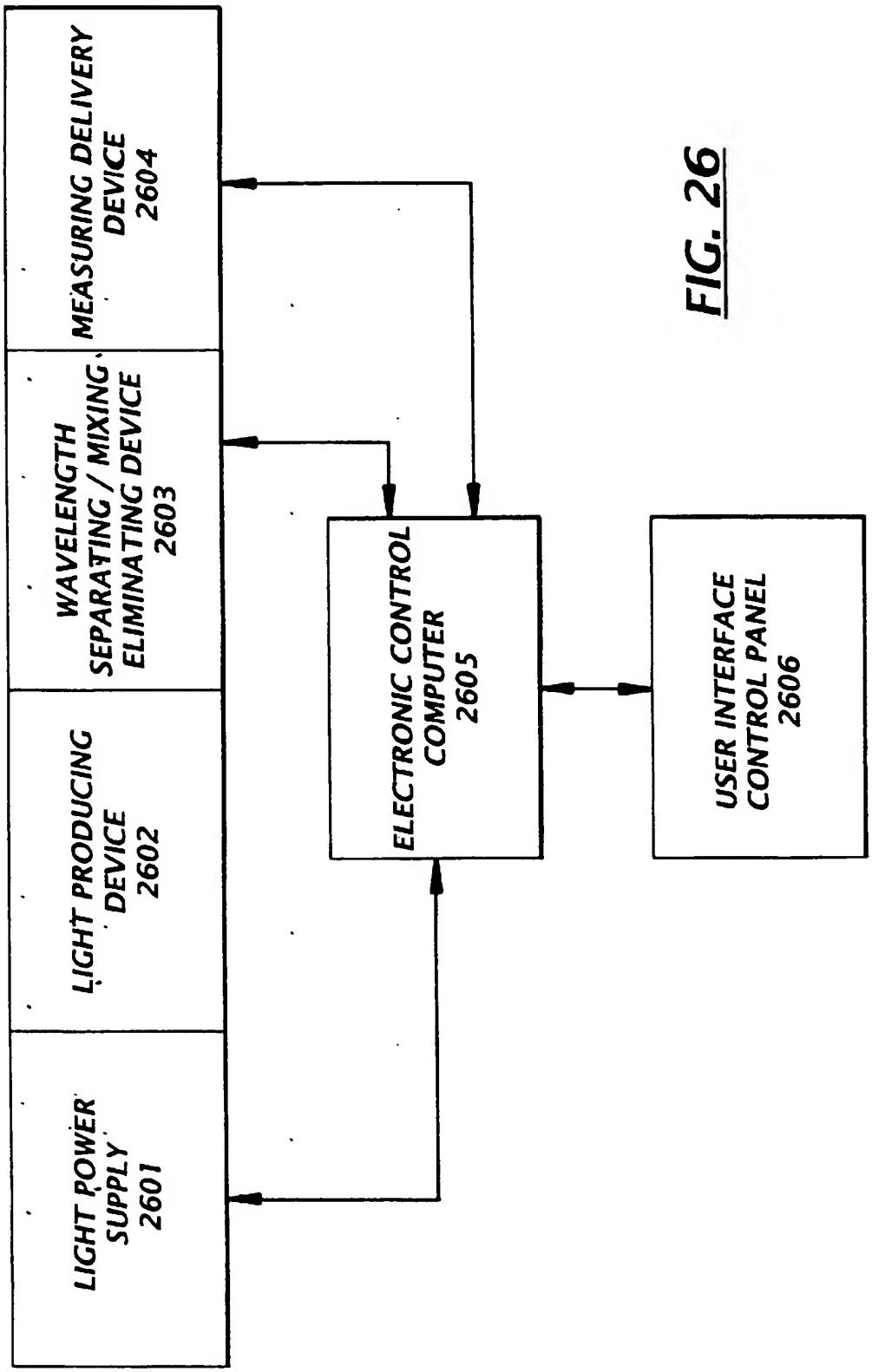

LIGHT POWER SUPPLY 2601
LIGHT PRODUCING DEVICE 2602
WAVELENGTH SEPARATING / MIXING ELIMINATING DEVICE 2603
MEASURING DELIVERY DEVICE 2604
ELECTRONIC CONTROL COMPUTER 2605
USER INTERFACE CONTROL PANEL 2606

FIG. 26

be applied using the inventive concepts. Further, only a few fields where the inventive concepts could be applied have been listed.

While the present invention has been described and illustrated in conjunction with a number of specific embodiments, those skilled in the art will appreciate that variations and modifications may be made without departing from the principles of the invention as herein illustrated, as described and claimed. The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are considered in all respects to be illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims, rather than by the foregoing description. All changes which come within the meaning and range of equivalence of the claims are to be embraced within their scope.

What is claimed is:

1. A light curing system for light curing of composite materials comprising:

a. a light power supply which utilizes electrical power to generate voltage and current at appropriate levels for use in the light curing system,

b. a light producing device configured to receive and utilize voltage and current from said light power supply, said light producing device being capable of producing light at selected intensities for selected periods of time,

c. a wavelength separating, mixing and eliminating device capable of receiving light from said light producing device and manipulating said light into a format for exposure to a polymeric material,

d. a delivery device capable of delivering light manipulated by said wavelength separating, mixing and eliminating device to a remote location for exposure to a polymeric material, and

e. a computer control system which controls said light power supply and said wavelength separating, mixing and eliminating device to produce light according to a selected modulation scheme based on the cured composite material.

2. A system as recited in claim 1 wherein said light producing device is a laser.

3. A system for light curing of polymeric materials comprising:

a. a light power supply which supplies power for use by a light source,

b. a light source which utilizes power supplied by said power supply to produce raw light,

c. a light refining device capable of receiving light from said light source and manipulating said raw light into a format suitable for exposure to a polymeric material,

d. a light delivery device capable of receiving light from said light refining device and delivering said light to a remote location for exposure to a polymeric material, and

e. a light modulation control system which modulates said light according to a predetermined light modulation scheme based on the cured polymeric material.

4. A system as recited in claim 3 wherein said light refining device includes at least one filter to eliminate unwanted wavelengths of light.

5. A system as recited in claim 3 wherein said light refining device includes at least one structure from the group consisting of prisms, diffraction gratings, frequency multiplying crystals, lenses, mirrors, filters, acusto optic tunable filters and poly chromatic acusto optic modulators.

6. A system as recited in claim 3 wherein said light source is capable of producing light at more than one frequency.

7. A system as recited in claim 6 wherein said light refining device is capable of mixing light of different wavelengths in predetermined percentages in order to produce light suitable for exposure to a polymeric material containing more than one initiator.

8. A system as recited in claim 3 wherein said modulation scheme includes adjusting light intensity and light duration over time.

9. A system as recited in claim 3 wherein said light source is capable of producing light of more than one wavelength and wherein said modulation control system is capable of selectively providing light of different wavelengths to said light delivery device.

10. A system as recited in claim 3 wherein said modulation scheme includes varying light intensity according to a predetermined waveform.

11. A system as recited in claim 3 further comprising a plurality of said light delivery devices so that light from said light source can be provided to multiple remote locations at the same time.

12. A system for curing dental materials, the system comprising:

a. at least one light source which produces raw light of at least one wavelength suitable for curing a dental material,

b. a poly chromatic acusto optic modulator capable of causing raw light from said light source to be processed into a format suitable for curing a dental material,

c. a delivery device capable of receiving light from said poly chromatic acusto optice modulator and delivering said light to a remote location for exposure to a polymeric materials,

d. a light modulation control system which modulates said light according to a predetermined light modulation scheme based on the cured polymeric material.

13. A system as recited in claim 12 wherein said modulation system directly controls emission of light by said light source.

14. A system as recited in claim 12 wherein said poly chromatic acusto optic modulator operates in conjunction with mirrors and diffraction gratings to format light to be provided to said delivery device.

15. A system as recited in claim 12 wherein said delivery device comprises a structure selected from the group consisting of glass fiber, a fluid-filled waveguide, a beam splitter, a photo diode, a mirror and a lens.

16. A system as recited in claim 12 wherein said measuring delivery device provides a feedback signal to said modulation system in order to permit said modulation system to accurately control light modulation.

17. A system as recited in claim 12 wherein said poly chromatic acusto modulator device is used to facilitate elimination of unwanted wavelengths of light.

18. A system as recited in claim 12 wherein said modulation scheme includes adjusting light intensity and light duration over time.

19. A system as recited in claim 12 wherein said modulation scheme includes varying light intensity according to a predetermined waveform.

20. A system as recited in claim 12 wherein said poly chromatic acusto modulator is capable of mixing light of

different wavelengths in predetermined percentages in order to produce light suitable for exposure to a dental material containing more than one initiator.

21. A system for polymerizing a material containing monomers, the system comprising:

a. a light source that can produce raw light of at least one wavelength suitable for curing a dental material,

b. a light delivery device capable of receiving light from said light source and delivering said light to a remote location,

c. a light refining system capable of modifying characteristics of said light in order to produce light in a format more suitable for exposure to the material containing monomers than said raw light, and

d. a light modulation control system which modulates said light according to a predetermined light modulation scheme based on the polymerizing material in order to control polymerization of the material containing monomers.

22. A system as recited in claim 21 wherein said light delivery device comprises a doped fiber optic which causes wavelength multiplying of light which passes through it.

23. A system as recited in claim 21 wherein said light delivery device comprises a fluid-filled waveguide which eliminates certain wavelengths of light produced by said light source before the light reaches the material containing monomers.

24. A system as recited in claim 21 wherein said light delivery device comprises glass fibers which eliminate certain wavelengths of light produced by said light source before the light reaches the material containing monomers.

* * * * *

48/3,K/33 (Item 33 from file: 350) **Links**
Derwent WPIX

014821429 **Image available**
WPI Acc No: 2002-642135/200269
Related WPI Acc No: 2003-090164; 2003-540096; 2005-251922
XRAM Acc No: C02-181339
XRPX Acc No: N02-507524

Wavefront modifying device for correcting aberrations in optical systems, has optical material layer in which spatial distribution of refractive index is controlled by extent of optical material curing

Patent Assignee: BRUNS D G (BRUN-I); OPHTHONIX INC (OPHT-N)
Inventor: BRUNS D G
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20020080464	A1	20020627	US 2000253418	P	20001127	200269	B
			US 2001875447	A	20010604		
US 6813082	B2	20041102	US 2000253418	P	20001127	200472	
			US 2001875447	A	20010604		

Priority Applications (No Type Date): US 2000253418 P 20001127; US 2001875447 A 20010604
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020080464	A1		13	G02B-026/00	Provisional application US 2000253418
US 6813082	B2			G02B-005/00	Provisional application US 2000253418

... **layer in which spatial distribution of refractive index is controlled by extent of optical material curing**

Abstract (Basic):
... modifying device has a layer of optical material comprising a monomer and at least one **polymerization** initiator. The spatial distribution of the refractive index over a predetermined area of the layer is controlled by the extent of **curing** of the optical material at each sub-region inside the area.
... desired refractive index profile, and to provide for an active monitor and control of the **curing** of each sub-region of the wavefront aberrator...

...layer, and the epoxy layer formed within the circular barrier confining the epoxy within a **predetermined** volume and having a variety of refractive index profiles between **different** sub-regions, and a cross-sectional view of the wavefront aberrator showing the positioning of...
Technology Focus:

...comprises transparent plates, a barrier (108) between the plates which confine the epoxy within a **predetermined** volume, a light emitting diode (LED) array panel having **several** LED elements, a control unit which controls the emission intensity and irradiation duration of each...

...a de-magnifier which images a predetermined area of the array panel on to a **predetermined** area of the epoxy layer, a radiation source which emits radiation with at least one **wavelength** within the absorption band of the **polymerization** initiator, initiating a **polymerization** process, a spatial light intensity modulator, a laser unit, a beam scan unit scanning independently in **two** dimensions addressing any **predetermined** location at the epoxy layer, an intensity control for the laser unit to control the...

...the spatial distribution of the radiation intensity transmitting through the wavefront modifying device and a **computer** in a feedback loop for monitoring the radiation intensity and controlling **curing** by controlling the intensity and duration of the radiation exposure. The optical material which comprises epoxy is contained between the transparent plates. **Curing** of the epoxy layer is controlled by irradiating the epoxy layer with the LED array panel and by controlling the spatial distribution of the irradiation intensity and exposure duration. **Curing** is achieved by directing the beam of laser at a predetermined area of epoxy layer...

...Title Terms: **CURE**

Manual Codes (EPI/S-X): **T01-E05A**...

US 20020080464A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2002/0080464 A1**

Bruns (43) **Pub. Date: Jun. 27, 2002**

(54) **WAVEFRONT ABERRATOR AND METHOD OF MANUFACTURING**

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(21) Appl. No.: **09/875,447**

(22) Filed: **Jun. 4, 2001**

Related U.S. Application Data

(63) Non-provisional of provisional application No. 60/253,418, filed on Nov. 27, 2000.

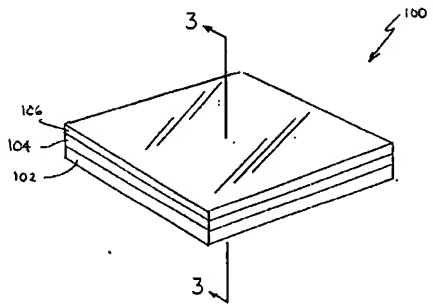
Publication Classification

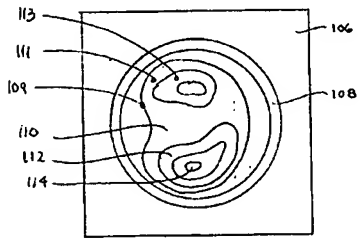
(51) **Int. Cl.**[7] **G02B 26/00**

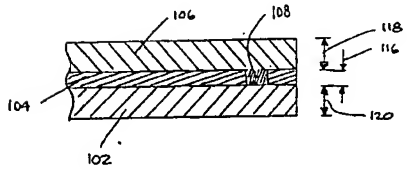
(52) **U.S. Cl.** **359/290**; 359/291

(57) **ABSTRACT**

The wavefront aberrator of the present invention includes a pair of transparent windows, or plates, separated by a layer of monomers and polymerization initiator, including a broad class of epoxies. This monomer exhibits a variable index of refraction across the layer, resulting from controlling the extent of its curing. Curing of the epoxy may be made by exposure to light, such as ultraviolet light. The exposure to light may be varied across the surface of the epoxy to create a particular and unique refractive index profile.







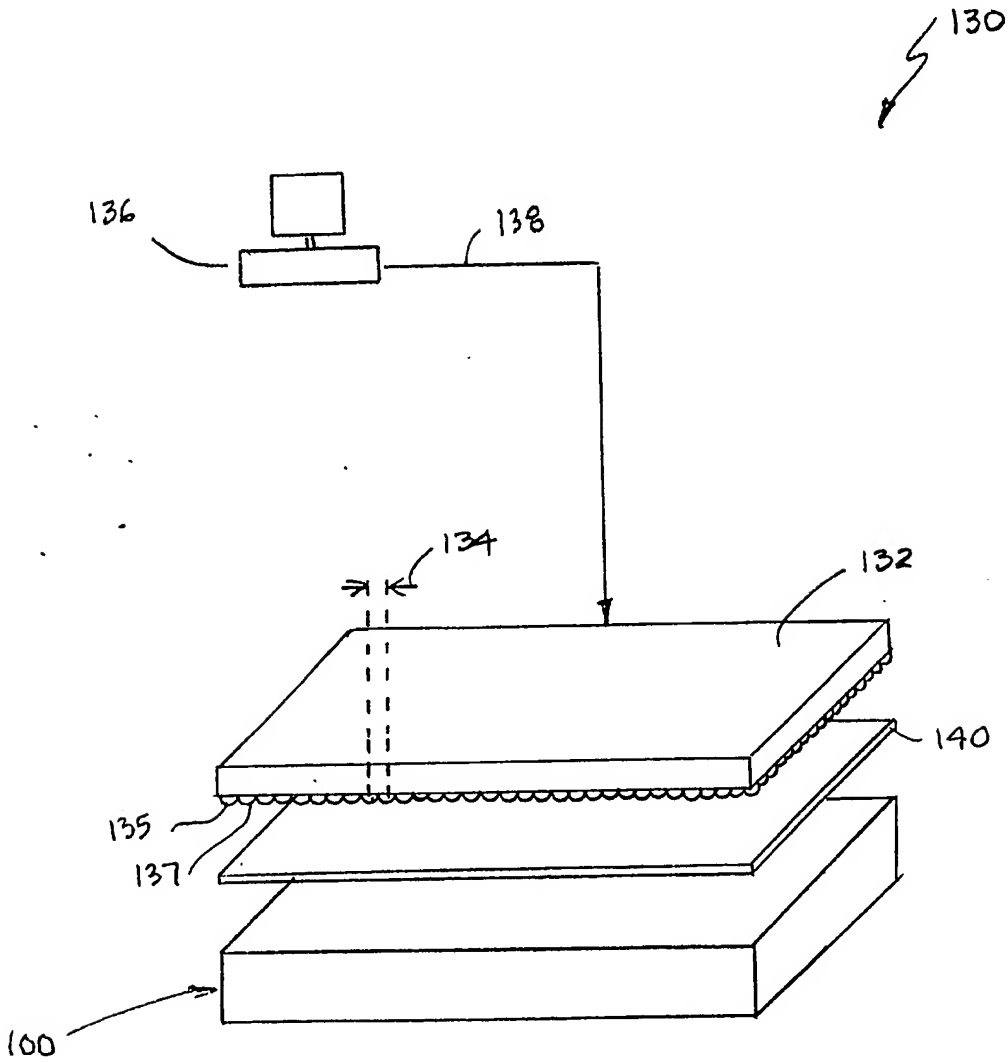


FIG. 4

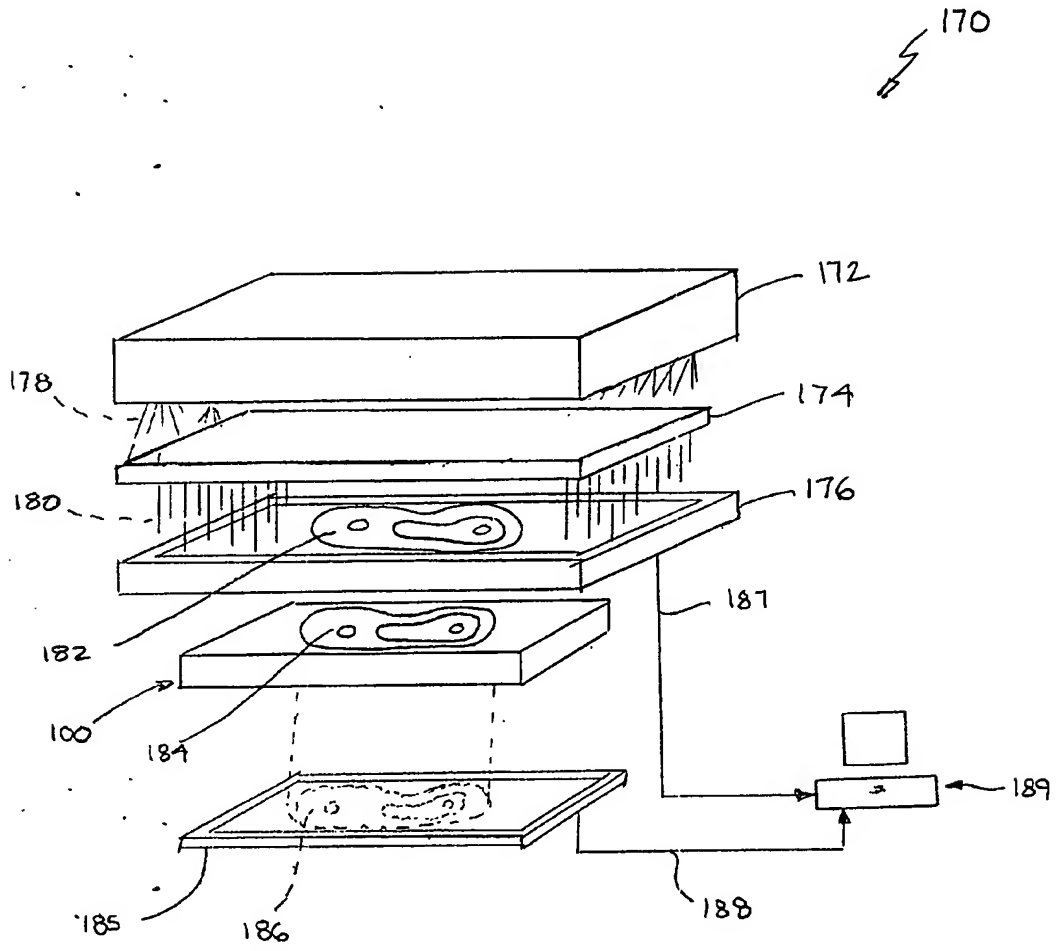


FIG. 6

phonium benzophene salts, aryl tert-butyl peresters, titanocene, or NMM may be used.

[0028] In the present invention, a light source containing a particular wavelength irradiates the monomer layer which activates the photo-initiator and begins the curing process within the epoxy. The curing process results in a corresponding change of the index of refraction within the resin. However, it is also to be appreciated that terminating the exposure to the particular wavelength of light ceases the curing of the epoxy, and ceasing the change of the index of refraction exhibited by the epoxy. In this manner, a aberrator **100** of the present invention may be formed by exposing certain portions of the resin **104** to a light source which varies with time and position, resulting in an aberrator having a varied index of refraction across its surface.

[0029] From **FIG. 2**, a variety of refractive index profiles are shown to be formed in resin layer **104**. More specifically, different refractive index profile is illustrated by regions **110**, **112**, and **114**, such that aberrator **100** includes three (3) distinct levels of refractive index.

[0030] It is to be appreciated that the incorporation of three (3) different levels of refractive index in **FIG. 2** is merely exemplary, and the present invention contemplates the incorporation of any number of refractive index profiles, and that those different profiles may be formed within epoxy layer **104** to have virtually any shape or local curvature. Moreover, the epoxy layer **104** may be considered to be an array of pixels, such as pixels **109**, **111**, **113**, which may each be selectively illuminated and cured to exhibit a particular index of refraction.

[0031] Referring now to **FIG. 3**, a cross-sectional view of the wavefront aberrator of the present invention taken along line **3-3** of **FIG. 1** is shown. Epoxy layer **104** is sandwiched between the upper transparent cover **106** and the lower transparent cover **102**, and held in place by barrier **108**. The enclosed volume of epoxy layer **104** is determined by the size of the barrier **108**, and the distance between the upper transparent cover **106** and the lower transparent cover **102**. In a preferred embodiment, the thickness **116** of the epoxy layer **104** is approximately 0.005 inches (0.125 mm), and the thicknesses **118** of the upper transparent cover **106** is approximately 0.025 inches (0.625 mm), and the thicknesses **120** of the lower transparent cover **102** is approximately 0.025 inches.

[0032] In a preferred embodiment, upper transparent cover **106** and lower transparent cover **104** are formed from a rigid transparent material, such as glass or plastic. While glass provides a stable platform for the formation of the refractive index profile, such rigidity is not necessary. In fact, covers **102** and **106** may be made from a flexible material, such as a transparent polymer. A suitable transparent polymer may include, but not be limited to, mylar film, polycarbonate film, or acetate film. Use of such materials results in a flexible aberrator having a distinct refractive index profile.

METHODS OF MANUFACTURING

[0033] Referring to **FIG. 4**, a system for manufacturing the wavefront aberrator of the present invention is shown and generally designated **130**. System **130** includes a light emitting diode (LED) array panel **132** having a number of diodes **135**, **137**, separated from adjacent diodes by a distance **134**, and controlled by a computer **136** through interface **138**. In a preferred embodiment, the distance **134** between diodes **135** and **137** varies, and may typically be approximately 0.125 inches (3.175 mm), though alternative distances may be used. A diffuser element **140** may be placed between LED array panel **132** and wavefront aberrator **100** to diffuse the light emitted by the LED array panel **132** to create a smoother refractive index profile.

[0034] In operation, once a desired refractive index profile is determined, computer **136** determines a particular pattern to be illuminated in the LED array panel **132** thereby generating a curing pattern which is directed through diffuser element **140** onto a aberrator **100**. By selectively illuminating particular LEDs **135** and **137**, for example, within the LED array panel **132**, the epoxy (not shown this Figure) is selectively cured. This selective curing creates a pre-determined, particular refractive index profile corresponding to the time of exposure of the epoxy as well as the intensity of the exposure. This selective curing results in an aberrator with areas having different indices of refraction. Thus, by varying the intensity and period of illumination of LEDs **135** and **137**, for example, the aberrator may be formed to exhibit the desired refractive index profile.

[0035] Referring now to **FIG. 5**, a system for manufacturing the wavefront aberrator **100** of the present invention is shown in a side view and generally designated **150**. System **150** includes an LED array panel **132** where each LED **151** generates a light beam **154** having an diverging angle **152**, and the LEDS collectively generate a curing pattern which is directed through a demagnifier imaging element **156** which focusses the curing pattern into light pattern **158** and onto a wavefront aberrator **100** to cure the epoxy (not shown this Figure) within the aberrator **100** to create a particular wavefront profile as shown in **FIG. 2**. Alternatively, the curing pattern can be magnified, instead of demagnified, to produce a larger area aberrator device.

[0036] **FIG. 6** depicts a system for manufacturing the wavefront aberrator **100** of the present invention and is generally designated **170**. System **170** includes a light source **172** adjacent a diffuser **174** which smooths the light beams **178** and creates uniform intensity light rays **180**. Light rays **180** pass through a computer controlled LCD **176** which acts as a spatial light intensity modulator and generates a curing pattern **182** such that when the LCD is exposed light rays **180** from light source **172**, light corresponding to the curing pattern **182** is transmitted through the LCD **176** and onto the wavefront aberrator **100** to create a particular refractive index profile **184**.

[0037] In a preferred embodiment, light source **172** of system **170** is a constant fluence light having a constant intensity across the illuminated surface of the light. For example, light source **172** may contain an array of LEDs, or any other suitable source of illumination. The optical transmissive properties of the LCD can be controlled by applying a variable electrical voltage to an array of electrodes on an LCD device. This provides for the spatial and temporal variation of the intensity of light transmitted through the LCD device to selectively cure the resin **104** in the aberrator **100**.

[0038] As an addition to system **170**, a detector **185** may be placed beneath aberrator **100** to detect the transmitted image **186** through aberrator **100**. A feedback interface **188**

may connect sensor **185** to computer **189**, which may in turn control LCD panel **176**. In this manner, a refractive index profile may be determined in the computer **189**, implemented in the LCD **176**, and verified in sensor **185**, thereby ensuring the appropriate wavefront profile was created in aberrator **100**. Sensor **185** may include a intensity imager, such as a CCD or a wavefront sensor, such as a Shack-Hartmann sensor.

[0039] Although panel **176** is discussed above as a LCD panel, an alternative embodiment could incorporate a photographic negative or positive that may be used to form the refractive index profile **184** in aberrator **100**. In this manner, light source **172** would present a constant source of illumination, and the photographic negative or positive containing the refractive index profile **182** would control the spatial and intensity level of illumination reaching aberrator **100** to create the proper refractive index profile **184**.

[0040] Referring now to **FIG. 7**, an alternative system for manufacturing the wavefront aberrator **100** of the present invention is shown and generally designated **190**. System **190** includes a beam scan unit **195** having a laser unit **191**generating a laser beam **193** which forms a point light source ("spot") **192** on aberrator **100** which may include a laser intensity control (not shown). Spot **192** is moved across the surface of the aberrator **100** in a rastering path shown by dashed lines **194**, **196**, and **198**, at varying speeds and with varying intensities to selectively cure the epoxy **104** to create a particular refractive index profile **212** having areas **214**, **215**, and **216**, with different indices of refraction.

[0041] Alternatively, a spot **200** may be formed and moved across aberrator **100** in paths **202**, **204** and **206**. Yet another alternative method of forming refractive index profile **212** includes the formation of spot **210** in the center of aberrator **100**, and movement of the spot along an outwardly spiraling path **212**. Also, a particular refractive index profile **212** may be traced, or circumscribed in a predetermined area, by laser beam **193** directly forming the boundaries between the areas **214**, **215**, and **216**, for example. In an alternative embodiment, laser beam **193** may remain stationary and the aberrator device **100** may be moved relative to the laser beam **193** such that the spot **210** moves across the surface of the aberrator. Specifically, aberrator **100** may be moved in directions **220** and/or **222** to move the spot **210** across the surface of the aberrator.

ALTERNATIVE EMBODIMENTS

[0042] **FIG. 8** is a side view of an alternative embodiment of the wavefront aberrator **100** of the present invention incorporating a transparent cover **232** formed in the shape of a lens having a face **233** showing a lens with position focusing power. Alternatively, a lens with negative focussing power and with cylindrical (astigmatism) power may also be incorporated. Sandwiched between face **233** and a transparent cover **236** is a layer **234** of index-changing epoxy. Transparent cover **232** has a spherical refractive surface **238** which functions an optical element. Thus, the cover **232** in combination with epoxy layer **234**, provides for an optical element having both focusing and wavefront phase profile characteristics.

[0043] An alternative embodiment of the wavefront aberrator of the present invention is shown in **FIG. 9** and generally designated **240**. Aberrator **240** includes an upper transparent window **242** and an adjacent layer **244** of index-changing epoxy. A lower transparent window **246** (shown in dashed lines) is formed from a dissolvable salt. Once the refractive index profile has been formed in the layer **244** of epoxy, the salt window **246** may be dissolved. The dissolving nature of window **246** provides for an exposed epoxy layer facilitating post curing treatment of the epoxy, if necessary. Alternatively, windows **242** and **246** may be made of organic materials which are dissolvable in organic solvents.

USES FOR THE PRESENT INVENTION

[0044] The present invention may be used to correct aberrations in virtually any optical system. For instance, the present invention may be particularly useful to correct inherent static aberrations in optical imaging systems, such as telescopes, binoculars, or microscopes. The present invention may also be particularly useful by incorporating aberration corrections into eyepieces of optical systems such as telescopes, binoculars, or microscopes.

[0045] The aberrator of the present invention may also be used to correct static aberrations in laser beams or associated optics for use in laser ranging, detection, scanning, communication, or tracking instruments. This listing of uses for the present invention is merely exemplary, and is not intended to limit the scope of the invention whatsoever.

[0046] While there have been shown what are presently considered to be preferred embodiments of the present invention, it will be apparent to those skilled in the art that various changes and modifications can be made herein without departing from the scope and spirit of the invention.

I claim:

1. A wavefront modifying device, comprising:

a layer of optical material comprising a monomer and at least one polymerization initiator, wherein the spatial distribution of the index of refraction over a predetermined area of said layer is controlled by the extent of curing of the optical material at each sub-region inside the area.

2. The device in claim 1, further comprising transparent plates wherein said optical material is contained between said plates.

3. The device in claim 2, further comprising a barrier between said plates confining said epoxy within a predetermined volume.

4. The device in claim 1, further comprising a LED array panel having a plurality of LED elements, wherein curing of said epoxy layer is controlled by the irradiating of said epoxy layer with said LED array panel.

5. The device in claim 4, further comprising a control unit controlling the emission intensity and irradiation duration of each LED elements in the LED array panel.

6. The device in claim 5, further comprising a de-magnifier, imaging a predetermined area of the LED array panel onto a predetermined area of the epoxy layer.

7. The device of claim 1, further comprising a radiation source emitting radiation with at least one wavelength within the absorption band of the polymerization initiator, initiating a polymerization process.

8. The device of claim 1, further comprising a spatial light intensity modulator, wherein curing of the epoxy is con-

trolled by controlling the spatial distribution of the irradiation intensity and exposure duration.

9. The device of claim 8, wherein the spatial light intensity modulator is chosen from a list comprising: (a) LCD array panel, or (b) photographic film, or (c) film with a printed profile for transmitting the irradiation source.

10. The device of claim 1, further comprising a laser unit wherein curing is achieved by directing the beam of the laser at a predetermined area of epoxy layer.

11. The device of claim 10, further comprising a beam scan unit scanning independently in two dimensions addressing any predetermined location at the epoxy layer.

12. The device of claim 11, further comprising an intensity control for the laser unit controlling the intensity and irradiation duration.

13. The device of claim 1, further comprising a radiation intensity monitor unit measuring the spatial distribution of the radiation intensity transmitting through the wavefront modifying device.

14. The device of claim 13, further comprising a computer in a feedback loop, monitoring the radiation intensity, and controlling curing by controlling the intensity and the duration of the radiation exposure.

15. The device in claim 1, wherein said optical material comprises epoxy

16. The device of claim 2, wherein one of the transparent plate has refractive power which can be either positive power, or negative power, with or without cylindrical power.

17. The device of claim 2, wherein the plate can be either rigid or flexible.

18. The device of claim 2, wherein the plate is comprised of salt or other material which is removable by dissolving.

19. A wavefront aberrator, comprising:

a first transparent cover;

a second transparent cover;

a layer of epoxy positioned between said first transparent cover and said second transparent cover and the layer having a pre-determined refractive index profile.

* * * * *

48/3,K/41 (Item 41 from file: 350) **Links**
Derwent WPIX

014366923
WPI Acc No: 2002-187625/200224
XRAM Acc No: C02-057834
XRPX Acc No: N02-142254

Marking a golf ball having a cover, involves directing a beam of laser radiation onto a portion of the cover which ablates to form a detectable mark

Patent Assignee: BROWN S W (BROW-I); ACUSHNET CO (ACUS-N)
Inventor: BROWN S W
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20010047986	A1	20011206	US 2000178468	A	20000127	200224 B
			US 2000739469	A	20001218	
US 6462303	B2	20021008	US 2000178468	A	20000127	200269
			US 2000739469	A	20001218	

Priority Applications (No Type Date): US 2000178468 P 20000127; US 2000739469 A 20001218
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20010047986	A1		6	B23K-026/00	Provisional application US 2000178468
US 6462303	B2			B23K-015/08	Provisional application US 2000178468

Abstract (Basic):
... The method employing a deflected-beam, **computer**-controlled laser source is flexible and readily and easily adapts to the formation of various...
Technology Focus:
... **POLYMERS** - ...

...Preferred Method: The laser radiation has a **wavelength** strongly absorbed by at least one component of the cover. The mark is formed without significant discoloration of the cover. The laser radiation has a **wavelength** in the infrared waveband of 9 - 11 (preferably 10.6) microns. The laser radiation is...

...detectable mark. The step of directing the beam of laser radiation is controlled by a **computer** programmable so as to direct the laser beam according to a predetermined pattern and according...

...Preferred Components: The cover comprises **polyurethane**, which is a product of the reaction between a **polyurethane prepolymer** and a **curing** agent with the

polyurethane prepolymer being a product formed by the reaction between a polyol and a diisocyanate. The **prepolymer** is product formed by the reaction between 4,4'-diphenylmethane diisocyanate and a polyether type polyol and the **curing** agent is polytetramethyleneoxide-di-p-aminobenzoate.

48/3,K/24 (Item 24 from file: 350) **Links**
Derwent WPIX

THIS APPLICATION

0I5342477 **Image available**
WPI Acc No: 2003-403415/200338
XRPX Acc No: N03-321726

Database for storing information used in designing photocuring system includes two or more element type fields having list of elements stored with respective wavelength response

Patent Assignee: 3M INNOVATIVE PROPERTIES CO (MINN); DANNER J S (DANN-I); KALGUTKAR R (KALG-I); MAHONEY W S (MAHO-I); OXMAN J D (OXMA-I); PALAZZOTTO M C (PALA-I); ZITZER N J (ZITZ-I)
Inventor: DANNER J S; KALGUTKAR R; MAHONEY W S; OXMAN J D; PALAZZOTTO M C; ZITZER N J
Number of Countries: 102 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200336516	A2	20030501	WO 2002US32568	A	20021011	200338 B
US 20030083753	A1	20030501	US 200114390	A	20011022	200340
AU 2002359258	A1	20030506	AU 2002359258	A	20021011	200460
EP 1472618	A2	20041103	EP 2002793781	A	20021011	200472
			WO 2002US32568	A	20021011	
JP 2005524885	W	20050818	WO 2002US32568	A	20021011	200555
			JP 2003538935	A	20021011	

Priority Applications (No Type Date): US 200114390 A 20011022
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200336516	A2	E	80	G06F-017/30	
	Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW				
	Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW				
US 20030083753	A1			G06F-007/00	
AU 2002359258	A1			G06F-017/30	Based on patent WO 200336516
EP 1472618	A2	E		G06F-017/30	Based on patent WO 200336516
	Designated States (Regional): AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR				
JP 2005524885	W		50	G06F-017/60	Based on patent WO 200336516

Database for storing information used in designing photocuring system includes two or more element type fields having list of elements stored with respective wavelength response

Abstract (Basic):

... The **database** comprises **two** or **more** element type fields, **selected** from a list of **photocuring** system elements e.g. substrates, photoinitiators, light sources, sensitizers, UV stabilizers, pigments and dyes and which include for each element a **name** and a representation of a **wavelength** response.

... Elements can be **selected** (525) from the **database** and visual comparisons of **wavelength** response can be displayed (535...

...a) A method of optimizing the performance of a **light curing polymer** system...

...b) A method for designing **photocuring** systems...

...For use in designing a **photocuring** system, such as might be used in graphic arts imaging, printing plates, photoresists, solder masks, coated abrasives; magnetic media, **photocurable adhesives**, **photocurable** composites, coatings, foams, shaped articles, caulking and sealing compounds, potting and encapsulated compounds, impregnating and...

...By **categorizing wavelength** response regions within the **wavelength** response information, components of a **photocuring** system can be **selected** so that overlap among **wavelength** response of system elements can be assured and a working **photocuring** system thereby designed...

...and fig. 4B are a flow chart of a process of picking elements for a **photocuring** system...

Title Terms: **DATABASE;**

International Patent Class (Main): **G06F-007/00**...

...**G06F-017/30**...

...**G06F-017/60**

...International Patent Class (Additional): **G06F-017/50**

Manual Codes (EPI/S-X): **T01-E01C**...

...**T01-J05B4P**

```
? d s
Set     Items   Description
S1     243449   S PHOTOCUR? OR (PHOTO OR LIGHT? OR LUMEN? OR EM OR THERM? OR ENERGY? OR
LASER? OR UV)()(CURE? ? OR CURING OR CURAT?) OR THERMOCUR? OR THERMOSET?
S2     269369   S CURE? OR CURING OR (HEAT? OR LIGHT? OR PHOTO? ? OR LUMEN? OR THERM? OR
ENERGY? OR LASER? OR UV)()(SET OR SETS OR SETTING)
S3     396306   S (LIGHT? OR HEAT OR LUMEN? OR THERMO? OR PHOTO? OR ENERGY? OR LASER? OR
UV)()TREAT? OR THERMOTREAT? OR PHOTOTREAT? OR HEATTREAT? OR LIGHTTREAT?
S4       7424   S (PHOTO? OR HEAT? OR LUMEN? OR THERMO? OR LIGHT? OR ENERGY? OR LASER? OR
UV)()(GLUE? OR ADHES? OR EPOX? OR BOND?)
S5       5578   S PHOTOADHES? OR THERMOADHES? OR (ULTRAVIOL? OR INFRARED?)()(CURE? OR
CURING? OR SET? ? OR SETT??? OR TREAT?)
S6    1157059   S DATABASE? OR DATAFILE? OR DATAREPOSITOR? OR DATABANK? OR DB OR DBS OR
DATA?()(BASE? OR FILE? OR REPOSITOR? OR BANK? OR STORAG? OR RECORD? OR SYSTEM?)
S7    5179665   S COMPUTER? OR PROCESSOR? OR DATAPROCESSOR? OR MICROPROCESSOR? OR SERVER?
OR CENTRALPROCESSOR? OR CPU? ?
S8      29906   S S1:S5 AND S6:S7
S9       1106   S WAVELENGTH? OR WAVE()LENGTH? OR ANGSTROM? OR LUMEN? ? OR PHOTON? ? OR
LIGHT()PARTICLE? OR NANOMET?
S10         1   S LIGHTWATT? OR LIGHT()WATT? ? OR CANDELA? ? OR CANDLEPOWER? OR
CANDLEPOWER? OR TALBOT? OR LUMBERG?
S11      1352   S NAME? OR DESIGNATION? OR ASSIGNATION? OR CATEGOR? OR CLASSIFIC?
S12       313   S TAG OR TAGS OR TAGGED OR TAGGING OR MARKER? OR LABEL?
S13       132   S IDENTIFIER? OR FLAG? OR TAB OR TABS OR TABBED OR TABBING?
S14      1276   S SPECTRUM? OR SPECTROSCOP? OR SPECTROGRAPH? OR (EM OR ELECTRO? OR
MAGNETIC?)()FREQUENC?
S15        41   S (LIGHT? OR PHOTO?? OR LUMEN?)(2N)(DISTRIBUTION? OR AMBIT? ? OR RANGE? ?
OR GAMUT? ? OR SCALE? OR AMPLITUD?)
S16      3168   S SELECT? OR CHOOS? OR ACTUAT? OR CLICK? OR PICK? OR OPT OR OPTS OR OPTED
OR OPTING OR OPTION? OR ACTIVAT?
S17       118   S CUSTOMIZ? OR CUSTOMIS? OR PERSONALIS? OR PERSONALIZ? OR INDIVIDUALIZ? OR
INDIVIDUALIS?
S18      6320   S ELECT? OR PICK? OR DESIGNAT? OR DISCRIMINAT? OR ASSIGN? OR SPECIFY? OR
PRESET? OR SCHEDUL? OR EXECUT?
S19      2630   S BEFOREHAND? OR IN()ADVANC? OR BEFORE? OR PREVIOUS? OR PREDAT? OR
PREDETERMIN? OR PRESELECT? OR REQUEST?
S20      6864   S TWO OR MORE(2W)ONE OR TWO(2W)MORE OR SEVERAL? OR 2ND OR NUMEROUS? OR
PLURAL? OR MULTIP? OR MULTIT?
S21      7007   S DUAL? OR PAIR? OR TWIN OR ANOTHER? OR EXTRA OR DI                  ? OR
AUXILIAR? OR ALTERNAT?
S22     13194   S POLYMER? OR THERMOPOLYMER? OR PLASTIC? OR THERMOP
POLYCARBONAT? OR POLYETHYLENE? OR POLYURETHAN?
S23      1648   S PMMA OR POLYIMIDE? OR POLYAMID? OR POLYOLEFIN? OR
COPOLYMER? OR POLYBUTYLENE?
S24      1740   S ETHYLEN?()VINYL?()ACETAT? OR POLYESTER? OR PHENOL                  ? OR
ACRYLIC?)()RESIN? OR POLYPROPYLENE?
S25     13401   S S8 AND S22:S24
S26       727   S S25 AND (S9:S10 OR S14:S15)
S27        59   S S26 AND S1:S5(5N)S22:S24 AND (S9:S10 OR S14:S15)
S28        13   S S26 AND S16:S17(5N)(S9:S10 OR S14:S15)
S29        10   S S26 AND (S9:S10 OR S14:S15)(5N)S11:S13
S30        47   S S26 AND S16:S19(5N)(S9:S10 OR S14:S15)
S31        18   S S26 AND S16:S19(5N)S20:S21
S32       119   S S27:S31
S33        86   S S32 AND PY<2002
S34        86   S S32 NOT PY>2001
S35        86   S S33:S34
```

```
S36          77   RD  (unique items)
 ; show files
```

[File 2] **INSPEC** 1898-2006/Feb W3

**File 2: Archive data back to 1898 has been added to File 2.*

[File 6] **NTIS** 1964-2006/Feb W2

[File 8] **Ei Compendex(R)** 1970-2006/Feb W3

[File 34] **SciSearch(R) Cited Ref Sci** 1990-2006/Feb W3

[File 35] **Dissertation Abs Online** 1861-2006/Feb

[File 65] **Inside Conferences** 1993-2006/Feb W4

[File 94] **JICST-EPlus** 1985-2006/Dec W1

[File 99] **Wilson Appl. Sci & Tech Abs** 1983-2006/Jan

[File 111] **TGG Natl.Newspaper Index(SM)** 1979-2006/Feb 20

[File 144] **Pascal** 1973-2006/Feb W1

[File 239] **Mathsci** 1940-2006/Apr

[File 248] **PIRA** 1975-2006/Jan W5

[File 256] **TecInfoSource** 82-2006/Feb

[File 323] **RAPRA Rubber & Plastics** 1972-2006/Jan

**File 323: Alert feature enhanced for multiple files, duplicate removal, customized scheduling. See HELP ALERT.*

36/3,K/38 (Item 8 from file: 323) **Links**
RAPRA Rubber & Plastics

00760493
Title: METHOD AND COMPOSITION FOR PRODUCING ULTRAVIOLET BLOCKING LENSES

Author: Buazza O M; Luetke S C; Powers G R
Corporate Source: Q2100 Inc.
Patent Number: US 5989462 A
Patent Date: 19991123
Patent Country/Kind Code: US A
Application Number: US 959973 (US 959973-1997)
Application Date: 19971029
Journal Announcement: 200004 **RAPRA Update:** 200006
Document Type: Patent
Language: English
Subfile: (R) RAPRA
Abstract: Disclosed are a system and method for **curing** eyeglass lenses to produce lenses which do not transmit UV light. **Activating** light having a **wavelength** greater than the **wavelength** of light, which the light absorbing compounds present in the composition absorb, are used. The... ...varying the lens forming conditions and the lens forming process may be controlled using a **microprocessor**-based control system.
Descriptors: APPLICATION; AUTOMATION; COMPANIES; COMPANY; **COMPUTER** CONTROL; CONTROL SYSTEM; **CURING**; DIAGRAM; ELASTOMER; LENS; LENSES; LIGHT TRANSMISSION; MACHINE; MACHINERY; **MICROPROCESSOR**; OPTICAL APPLICATION; **PLASTIC**; RUBBER; TECHNICAL; ULTRAVIOLET IRRADIATION; UV LIGHT; **WAVELENGTH**
Publication Year: 1999

36/3,K/24 (Item 2 from file: 94) **Links**
JICST-EPlus

03385453 **JICST Accession Number:** 97A0626743 **File Segment:** JICST-E
Laser beam lithography and innovation in product development process.
SHIMIZU TAKASHI (1)
(1) NTT Data Tsushin
Nippon Kikai Gakkai Tsujo Sokai Koenkai Koen Ronbunshu (Proceedings of the International Sessions JSME Spring Annual Meeting) , **1997** , VOL.74th,NO.5 , PAGE.590-593 , FIG.5, TBL.1
Journal Number: X0588AAU
Universal Decimal Classification: 678.023/.029+678.05
Language: Japanese **Country of Publication:** Japan
Document Type: Conference Proceeding
Article Type: Short Communication
Media Type: Printed Publication
, **1997**
Abstract: In this paper, the stereo lithographic method, which is three-dimensional shape forming technology **different** from conventional cutting methods, is **picked** up. The stereo lithographic method is a technology for manufacturing a three-dimensional model by scanning ultraviolet laser beam on **ultraviolet setting** resin. This paper shows an outline, an apparatus, application fields, and uses of a stereo...
Descriptors: ...**computer** graphics
Broader Descriptors: ...**polymer** reaction... ...**photon** beam... ...**computer** application

36/3,K/68 (Item 38 from file: 323) **Links**
RAPRA Rubber & Plastics

00418027
Title: MODELLING PHOTOINITIATOR PERFORMANCE IN UV CURED COATINGS

Author: Gatechair L R
Corporate Source: CIBA-GEIGY CORP.
Conference Proceedings: RadTech '88-North America (Volume 1).Conference Proceedings
Corporate Editor: RadTech International
Source: New Orleans, La., 24-28th April, 1988, p.28-36. 895
Journal Announcement: 199106 **RAPRA Update:** 199109
Document Type: Conference Papers
Language: English
Subfile: (R) RAPRA
Title: MODELLING PHOTOINITIATOR PERFORMANCE IN UV CURED COATINGS
Abstract: A computer program was developed to model the absorption of various photoinitiators. Beer's law was utilised... ...or transmitted) at various points within a coating. The calculations were carried out at each wavelength emitted by a selected lamp. Knowledge of the fraction of radiation absorbed at various points within the coating allowed...
Subject Heading (RAPRA): ...UV curing, ...photoinitiators; CURING,
Descriptors: ABSORB; ABSORPTION; APPLICATION; CALCULAT; COATING; COMPANIES; COMPANY; COMPUTER PROGRAM; CONCENTRAT; CURING; DATA; GRAPH; MODEL; MODEL COMPOUND; PHOTOINITIATOR; PHOTOPOLYMERISATION; PLASTIC; POLYMERISATION INITIATOR; TABLES; TECHNICAL; UV CURING ; PHOTOPOLYMERIZATION; POLYMERIZATION INITIATOR
Publication Year: 1988

36/3,K/28 (Item 4 from file: 144) **Links**
Pascal

12679782 PASCAL No.: 96-0380472

Dose-depth simulations in standard construction geometries
Radiation **curing** of composites

FLOYD J E; CHAPPAS W J
CHAPPAS Walter J, ed
Department of Materials and Nuclear Engineering, A. James Clark School of Engineering, Glenn L. Martin Institute of Technology, University of Maryland at College Park, College Park, MD 20742-2115, United States
University of Maryland, United States
Journal: Radiation physics and chemistry : (1993)
, . **1996**, 48
(2) 179-193
.Language: English

Radiation **curing** of composites
1996

...many of today's largest and most promising composite applications, the protracted time to autoclave **cure** a product can often make their use uneconomical. For some applications, radiation **curing** can overcome these shortcomings if a suitable irradiation strategy is determined. Unfortunately, traditional dosimetry methods...

... advent of inexpensive computing power offers an alternative. This work illustrates the use of a **computer** model, ITSv3.0, an electron/**photon** Monte Carlo code, for determining irradiation strategies.

English Descriptors: Composite material; **Thermosetting** resin; **Curing**(**plastics**); Transport properties

Spanish Descriptors: Material compuesto; Termoestable; Endurecimiento(material **plastico**); Propiedad transporte